

Program Name: **M. Sc. Biochemistry**

Program specific Outcomes

A student completing this program will be able to

PSO1: An in depth understanding of molecular processes that enable proper functioning of various systems like division, defence, circulation, respiration etc of a living system, be it animal system, plant system, or microbial system.

PSO2: A skill set that enables independent working in a laboratory with ability to design experiments, analyze and interpret data, thereby, enhancing research aptitude

PSO3: Access research/review articles and understand critical aspects of concepts.

PSO4: Proficiency in communication (Spoken and written) and discussion of scientific literature.

PSO5: Comprehend the etiology, epidemiology, nutritional interventions and therapeutics of diseases/ disorders prevalent in humans, plants, animals and thereby play a pivotal role in social awareness of the same.

Course outcomes for all courses offered by the department:

Semester	Course code	Course name	Course Outcomes Student completing this course is able to
1	PBC-1801	Proteins Structure Synthesis and Working	1: To describe the structure of protein and correlate with its functions such as molecular motors, interaction, carriers, signalling, repair and structure 2: To describe the synthesis of protein, its sorting and degradation 3: To understand and interpret the original experiments carried out to propose structure and functioning of various proteins 4: Ability to interpret Ramachandran plot and explaining proteins structure using bioinformatics tool 5: To explain techniques used in understanding the working of the proteins 6: To appreciate the importance of proper folding of proteins and relate to health, agriculture, and environmental issues arising from its expression.
1	PBC-1802	Nucleic Acids :Structure and Working	1: To explain the synthesis, breakdown of nucleic acids and role of inhibitors which has applications in medical field. 2: To demonstrate the existence of various forms of nucleic acids and its relevance and to comprehend that the modern concepts of DNA structure beyond what Watson – Crick proposed. 3: To analyze how topological changes and condensation of DNA influences gene expression

			<p>3: To explain the concept of RNA interference and its applications in various fields</p> <p>4: To describe and interpret experimental result arising from various DNA based studies</p> <p>5: To apply the concepts of regulation of gene expression as a tool in research and industry</p> <p>6: To assess how genetic complexity is associated with repetitive sequences and gene duplications.</p>
1	PBC-1803	Carbohydrates and Lipids	<p>1: To identify biological importance of carbohydrates and lipids</p> <p>2: To distinguish between anabolic and catabolic processes of carbohydrates and lipids</p> <p>3: Compare and contrast metabolic pathway of complex carbohydrates in different living system</p> <p>4: To elucidate the role of lipids in maintaining homeostasis at cellular and systemic level</p> <p>5: Recognize and explain the contribution of lipid biochemistry in understanding the development of certain human diseases such as Niemen-peck disease, Tay-Sachs syndrome, hypercholesterolemia etc.</p>
1	PBC-1804	Techniques in Biochemistry	<p>1: To describe the various centrifugal techniques used for fractionation of cells, cell organelles and bio-molecules.</p> <p>2: Apply the techniques of chromatography and electrophoresis to separate bio-molecules.</p> <p>3: Explain individual components of different instruments.</p> <p>4: Define the principles of various spectroscopic techniques used for characterization of bio-molecules.</p> <p>5: Implement the theoretical knowledge gained experimentally all the analytical techniques for characterization of bio-molecules.</p>
1	PBC-1805L	Practical Biochemistry - I	<p>1: To explain techniques used in understanding biomolecules</p> <p>2: Ability to isolate and estimate various biomolecules</p> <p>3: To learn to interpret the results</p>
1	PBC-1806L	Practical Biochemistry-II	<p>1: To explain techniques used in understanding the nature of proteins and nucleic acids</p> <p>2: Ability to isolate and estimate various biomolecules</p> <p>3: To learn to interpret the results</p> <p>4: Apply the techniques of chromatography and electrophoresis to separate bio-molecules.</p> <p>5: Explain individual components of different instruments.</p>

2	PBC-2801	Cell Biology	<ol style="list-style-type: none"> 1: Describe the molecules of life and conserved structures; recount how the working of the cell was discovered through model organisms 2: Recognize and identify the importance and functions of cell membrane 3: Distinguish signalling pathways for regulation of various cellular mechanisms 4: Explaining mechanism of development across species 5: Appreciating the use of various model organisms to relate the development of vertebrates
	PBC-2802	Enzymes: Structure to Function	<ol style="list-style-type: none"> 1: To describe the different models of enzyme catalysis and the mechanisms for its assessment 2: To explain various methods for identifying active site residues 3: To illustrate the several methods for the enzyme regulation 4: To appreciate the applicability of enzymology in various industries for growth and sustainability 5: To develop skill for analyzing kinetic data of enzyme substrate reaction
2	PBC-2803	Immunology	<ol style="list-style-type: none"> 1: Discuss the history of important landmarks in the mammalian immune system 2: Correlate the molecules and organs of immune system 3: Infer the use of immunological for methods diagnosis and therapeutics 4: Analyzing the negative connotations of the immune system 5: Compare and contrast the response of the host immune system to different pathogens
2	PBC-2804	Neurobiology	<ol style="list-style-type: none"> 1: To give an overall understanding of the organisation of nervous system 2: To explain the process of neuronal cell signalling and the role of ion channels 3: To calculate the membrane potentials that can lead to signal transmission and to equate a neuron to a circuit to calculate the potentials 4: To differentiate and to characterise neurotransmitters and neuromodulators 5: To target molecules involved in the nervous system for designing drugs to treat neurological disorders 6: To describe the sensory systems' structure and functions 7: To describe the psychophysical laws of perception and its nuances 8: To design simple experiments to study aspects related to the nervous system.

2	PBC-2805L	Enzymology Lab	<p>1: To describe the different models of enzyme catalysis and the mechanisms for its assessment</p> <p>2: To appreciate the applicability of enzymology in various industries for growth and sustainability</p> <p>3: To develop skill for analyzing kinetic data of enzyme substrate reaction</p>
2	PBC-2806L	Cell Biology and Immunology Lab	<p>1: To study the techniques used in understanding the characteristics of immune system</p> <p>2: To understand the nature of yeast growth</p>
3	PBC-3801	Molecular Biology	<p>1: To compare the replication and repair mechanism in eukaryotic system with the prokaryotic system</p> <p>2: To explain the process of transcription in eukaryotes and its multi-level regulation</p> <p>3: To correlate the external signalling with the changes in gene expression</p> <p>4: To describe gene regulation and its significance in biological sciences</p> <p>5: To learn to apply various molecular biology techniques in research</p> <p>6: To explain methodologies that have been used to understand the concepts of molecular Biology</p> <p>7: To design simple experiments based on the concepts of gene expression in eukaryotes.</p>
3	PBC-3802	Recombinant DNA Technology	<p>1: To explain the basic tools required in recombinant DNA technology</p> <p>2: To explore the methods used to study gene location and structure</p> <p>3: To know the various techniques used to study the gene expression and regulation</p> <p>4: To assess the techniques used in analyzing transcripts and proteins</p> <p>5: To be discuss problems associated with production of recombinant molecules</p> <p>6: To explore the use of recombinant DNA technology in betterment of the society.</p>
3	PBC-3803	Plant Biochemistry	<p>1: To understand the process of photosynthesis and to compare with different types of carbon fixation.</p> <p>2: To illustrate the importance of promoting plant diversity and green cover</p> <p>3: Compare and contrast the pattern of development in plants with respect to animals</p> <p>4: Assessing and analyzing the effect of environmental, chemical factors on plant growth development</p> <p>5: Developing the apotheosis to understand intricate behaviour of metabolic pathways in different plant types</p> <p>6: Imparting the capability to use various modus operandi to augment plant health and growth</p>

			Enabling the use of in-age techniques for the finest production of varied plant-derived phyto-chemicals
3	PBC-3804	Diseases: Nutritional and Molecular Perspectives	<p>1: Name and describe metabolic syndromes and life style disorders; justify suitable nutritional measures for their prevention.</p> <p>2: Present an informed discussion on patho-physiology, etiology of cardiovascular diseases and illustrate the role of nutritional interventions in reducing prevalence.</p> <p>3: Describe the molecular, dietary origins and causes of types of cancers and recognize the adverse effects of the disease on nutritional intake of patients.</p> <p>4: Distinguish malnutrition related disorders by identifying underlying causes and infer the outcome.</p> <p>5: Categorize bone disorders with respect to related nutritional deficiencies and evaluate the status of bone deformities and weakening in patients.</p>
3	PBC-3805L	Molecular Biology Techniques	<p>1: To explain the basic tools required in recombinant DNA technology</p> <p>2: To be discuss problems associated with production of recombinant molecules</p> <p>3: To explore the use of recombinant DNA technology in betterment of the society</p>
3	PBC-3806L	Techniques in Plant Biochemistry	<p>1: To understand the process of photosynthesis and to compare with different types of carbon fixation.</p> <p>2: To quantify the secondary metabolites that are needed for plant growth</p> <p>3: Assessing and analyzing the effect of environmental, chemical factors on plant growth development</p>
4	PBC-4801	Research Methodology and Scientific Writing	<p>1: Promulgate the understanding of formulating, pursuing and analyzing research benefitting human development</p> <p>2: Sensitize students regarding the ethics of conducting research by enabling in-depth understanding of plagiarism</p> <p>3: Imparting necessary traits to analyze, compare, logically criticize and evaluate biological data</p> <p>Developing competitive acumen to use modern-age computer programs to analyze and represent research data</p> <p>4: Elevate skills of scientific writing to present research interpretations in a form of research paper, presentation, book chapters and short communication</p>
4	PBC-4802	Research Project	1: Apply critical thinking skills

			2: Apply foundational research skills to address a research question 3: Demonstrate planning, time and change management skills.
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